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FRUIT TREES

A SPRAYING PROBLEM FOR THE
NORTHWEST APPLE ORCHARDS

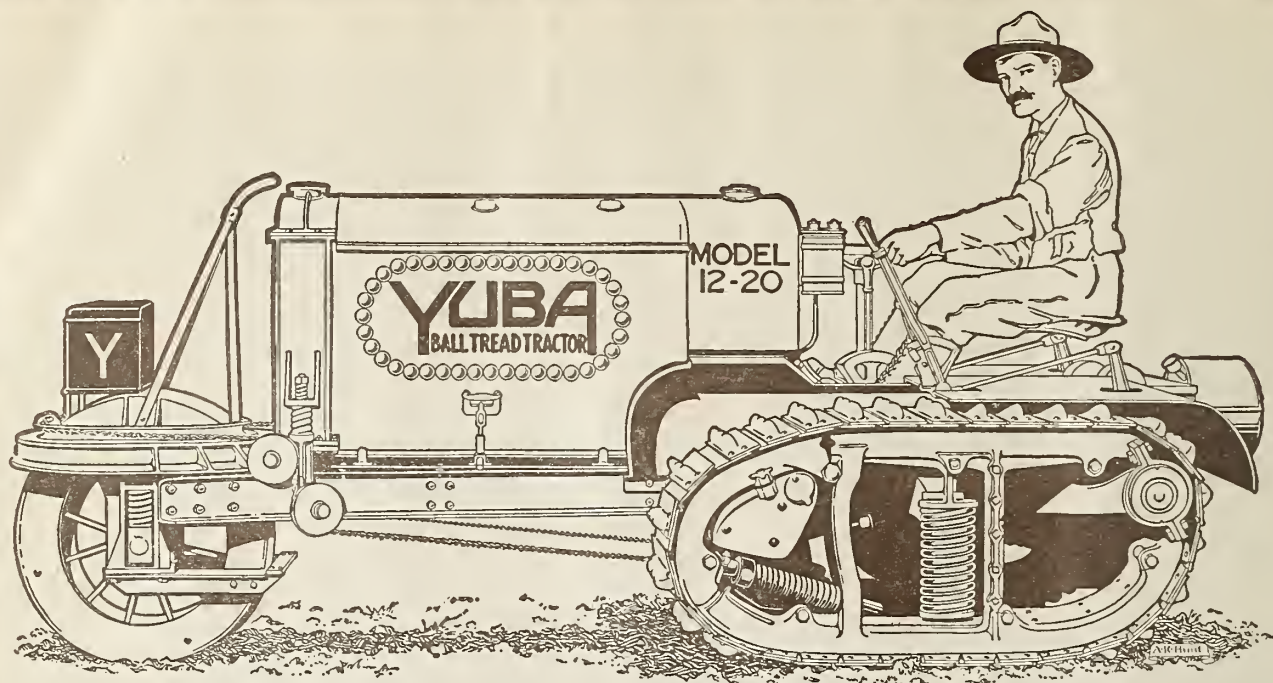
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The Abuse of Water on Fruit Trees

By D. F. Fisher, Office of Fruit Disease Investigations, U. S. Department of Agriculture—Presented at the Annual Meeting of the Washington State Horticultural Association, Kennewick, Washington, January 3, 1918

IT may be somewhat surprising to hear that irrigation water, which is so essential to the production of fruit in many parts of the Northwest, can be and often is harmful both to trees and fruit. The indictment of water, however, cannot be limited to its use in irrigation, for water is water, whether applied in furrows or gratuitously supplied from the clouds. Perhaps it would be putting it too strong to say that fruit diseases due to soil moisture conditions are more prevalent in irrigated districts than elsewhere, but certainly we may say that they appear to be more aggravated and they have been more closely studied.

It is also true that such diseases can be more nearly controlled under irrigation than under conditions of natural rainfall, since the water supply is more nearly under the control of the grower. If irrigation practices were standardized it would be comparatively easy to point out in a general discussion such as this just what phases of irrigation are objectionable and the manner in which they could be corrected. But irrigation practices cannot be standardized; different conditions require different treatment and growers are required to exercise their own judgment in irrigating their orchards. This permits of a wide variation in practice and we find growers who would flood their orchards continually if they could secure the water, and others whose orchards are in a constant state of drouth, while in between the two extremes the balance of the growers follow individual ideas, many scientifically founded and highly beneficial, but some positively harmful. Injury from the use and abuse of water, however, is not always a direct result of methods of irrigation. But if other environmental factors, dependent on, or caused by soil moisture conditions, are concerned, they are usually within the power of the orchardist to remedy.

While more progress is being made in irrigated districts in the correction of this class of diseases than elsewhere, there is still a woeful lack of general knowledge concerning these problems and a failure to apply many of the principles which have been established. In every section we may still find the clean cultivation "crank," who continues to deplete his soil of plant food and exhaust the humus essential to the retention and penetration of irrigation water. His trees become yellowish in appearance, the foliage thin and sparse, the new growth stunted and weak, while the fruit crop constantly diminishes in size and quality. In his attempts to

correct these conditions he pours on more and more water, but usually without avail unless he resorts to subsoiling, and then the relief is only temporary. The surface of the soil may become saturated, but without humus the water will not penetrate to the roots. The "plow-sole" becomes a kind of "hardpan" and is so cemented as to exclude the water and starvation of the trees very naturally results.

We still find plenty of rosette in apple orchards, usually under the conditions just described, even though it is a generally accepted fact that an alfalfa shade crop planted in such orchards

tial to the proper nutrition of the trees, since all of the plant food obtained from the soil is used in a water solution. Drouth, then, is starvation as well as acute thirst. Water is essential to the maintenance of turgor and activity of all the parts of the growing plant, so that when the water supply fails the plant not only starves but its cells dry out and die. A chronic drouth may not immediately kill the tree, but it causes so much devitalization that even after the return of proper soil moisture conditions the tree remains for a long time sick. Drouth kills the fine feeding roots which supply the tree with food so that the balance between roots and foliage is destroyed. The leaf surface is then reduced and new wood growth stunted. Due to the destruction of the delicate feeding roots the tree will require careful nursing for a considerable period if it is to completely recover from a prolonged drouth. Soil moisture conditions must be carefully watched, for the tree is then much more susceptible to drouth than before. The reduced foliage also invites sunscald and proper shading should be resorted to in order to prevent this injury.

It sometimes happens that a sudden and acute drouth is encountered following normal conditions of growth. In this case the tree invokes the law of self-preservation and extracts moisture from the fruit for the maintenance of its foliage and vegetative parts. It is more concerned in saving itself than in propagating itself. We find that the apples shrivel on the tree before the leaves show signs of wilting. With the early return of adequate soil moisture conditions many varieties of apples will recover their normal size and, apparently, be none the worse for the experience. But in the case of certain varieties, of the Winesap and Ben Davis groups especially, the drouth is accompanied by a spotting of the fruit which we have termed "drouth spot." After a certain stage in the drouth is reached irregular reddish, water-soaked spots appear on the apples and a sticky yellowish exudate is formed on the spots. This is sweetish to the taste and has sometimes been mistaken as a sign of blight infection on this account. But the taste of the apple tissue from the spot itself is extremely bitter, and this has caused some people to regard it as bitter rot. I know of cases where growers have sprayed for this disease, thinking it must be bitter rot because it tastes bitter, and of others who were on the point of pulling out their trees because they were sure it was a case of

Announcement

The publication offices of Better Fruit have been removed from Hood River to Portland, Oregon. This change was deemed expedient owing to better facilities for publication at Portland.

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will in a short time correct this condition. While no definite study of this disease is available for report it seems probable that rosette is merely the response to a soil moisture condition, possibly complicated by nutritive problems or the poisonous effects of concentrated soil solutions which are corrected by the culture of alfalfa among the trees. Alfalfa roots penetrate deeply and, in decaying, humus is distributed through the area occupied by the tree roots. Channels for the penetration of irrigation water are thus provided through the "hardpan" and a balanced supply of plant food for the trees is insured. By this re-establishment of normal growth conditions the tree affected with rosette is soon able to overcome the disease.

There are numerous other diseases which are affected by the supply of soil moisture, some of which are generally understood, but which it may be profitable to review. The first class of such diseases which comes to mind is that caused by a lack of water or drouth. A state of chronic drouth is responsible for a lack of tree growth and small-sized fruit. Water is essen-

Continued on page 18

A Spray Program for the Northwest Apple Orchards

By Leroy Childs, Entomologist and Plant Pathologist, Hood River Experiment Station

THE accompanying spray calendar is so arranged that it will adequately cover the needs of the orchardist in most of the apple growing sections of the Pacific Northwest. It must be understood that this is not a blanket recommendation, for there are indeed but few localities that would demand all of these applications of spray listed in order to effect control of the different apple pests. The orchardist must determine, first, the pests that must be controlled in his orchard, and secondly in his procedure, with the assistance of his local adviser, determine whether seasonal conditions warrant the alterations of the program. The calendar presented is arranged to meet maximum adversities from the standpoint of weather conditions and pest development, with a result that during many seasons decided alterations may be necessary. In the alteration of these arranged sprays the advice of an expert orchard investigator should be obtained if possible.

Seasonal development is the most important factor in making the necessary alterations in any spray schedule. Usually a late spring is a decided advantage to the orchardist from the standpoint of the number of sprays that will be necessary during the season. This is especially true in the control of apple scab. In order to completely protect the orchard from the disease it is necessary to keep the foliage protected from the delayed dormant stage (Figure 1) until the spring rains are over. Under the conditions which exist at Hood River rains can be expected until

about the first of July. Two applications a month are necessary to keep the foliage and developing fruits coated, so that if the delayed dormant stage is reached by April 1, which often happens, it would be necessary to make five application of a fungicide in order to obtain complete protection. If, on account of delayed plant development, this is applied April 15, four applications will be effective, and should this be delayed until May 1, as was the case in Hood River in 1917, three applications in many cases gave excellent results.

Discussions of Different Applications.

In connection with the different applications given in the calendar there are a few important factors that should be discussed somewhat at length; lack of space prevents this in the tables. For the sake of clearness, a discussion of each application follows, the paragraph number corresponding with the spray number given in the calendar.

1. **Dormant Spray.** The oil application is a dormant spray and is only advised in orchards where the leaf roller is present. When used for this insect it is incidentally effective in controlling both San Jose scale and brown aphids. However, under Northwestern conditions, rains following the application of spray within three to five days, its effectiveness is greatly reduced. Warm, settled weather conditions are absolutely essential to insure the leaf roller eggs being destroyed by the oil. The best results have been obtained by waiting until the buds are well swollen

and the tips of the first leaves are just beginning to show. For the control of San Jose scale and oyster shell scale lime-sulphur used 1-8 will be found less expensive and more effective, provided rainy weather follows the appli-



FIGURE 1—Delayed Dormant Spray.

cation. If the lime-sulphur is used as an early dormant application (before the buds swell) use Black Leaf for brown aphid control in Spray No. 2.

2. **Delayed Dormant Spray.** The delayed dormant spray is primarily a scab spray. Protection is needed at this time as spores of the fungus are being discharged in large numbers from the old fallen leaves. In orchards where the brown aphid is troublesome (the insect which causes the small, knotty clusters

Spray Program for Northwest Apple Orchards

Application	Insect and Plant Disease	Material and Time of Application
1. Dormant Spray.	Leaf roller Brown aphid San Jose scale Oyster shell scale	For the leaf roller, miscible oil, 6 to 100. Use only in orchards where leaf roller control is desired or where San Jose scale is serious. Apply as late as possible in the spring, under warm, settled weather conditions. (See discussion for Spray 1.)
2. Delayed Dormant Spray.	Apple scab Apple mildew Brown aphid	For scab, lime-sulphur 32°, 1 to 25.* For mildew, add iron sulphide mixture, 10 to 100. For brown aphid, add tobacco (nicotine sulphate) 1 to 1200. Apply at time the first leaves are unfolding about the bud clusters on the fruit spurs. (See discussion for Spray 2.)
3. Pink Spray.	Apple scab Mildew Bud moth	For scab, lime-sulphur 32°, 1 to 30. For mildew, add iron sulphide mixture, 10 to 100. For bud moth, add arsenate of lead, 4 to 100 (powder 2 to 100). Do not apply until the fruit buds stand separated in the clusters (Figure 2). (See discussion for Spray 3.)
4. Calyx Spray.	Apple scab Mildew Codling moth	For scab, lime-sulphur 32°, 1 to 35. For mildew, add iron sulphide, 10 to 100. For codling moth, add arsenate of lead, 4 to 100. Apply as soon as petals fall. (See discussion for Spray 4.)
5. Ten-Day Spray.	Apple scab Mildew	For scab, lime-sulphur 32°, 1 to 40. For mildew, add iron sulphide mixture, 10 to 100. Apply 10 to 15 days following calyx application. (See discussion for Spray 5.)
6. Thirty-Day Spray.	Apple scab Codling moth (if present) Green aphid Woolly aphid	For scab, lime-sulphur 32°, 1 to 50; or self-boiled lime-sulphur, 6-6-50.† For codling moth, add arsenate of lead, 4 to 100. For green and woolly aphid, add tobacco, 1 to 1200. Apply 30 days following the calyx application. (See discussion for Spray 6.)
7. July Spray.	(Advisable in certain sections for) Codling moth Green aphid Woolly aphid	For codling moth, add arsenate of lead, 4 to 100. For green and woolly aphid, add tobacco, 1 to 1200. In applying this spray consult with your nearest expert. (See discussion for Spray 7.)
8. Third Codling Moth Spray.	Codling moth Anthracnose Late scab Woolly aphid	For codling moth, add arsenate of lead, 4 to 100. For anthracnose and late scab, add bordeaux mixture, 3-4-50.‡ For woolly aphid, add tobacco, 1 to 1200. Date of application can only be told by seasonal development of codling moth through breeding cage studies. Get in touch with nearest entomological investigator. (See discussion for Spray 8.)
9. Fall Spray.	Anthracnose	For anthracnose, bordeaux mixture, 6-6-50. Apply as soon as fruit is harvested.

* If lime-sulphur does not test 32°, see accompanying table for the proper dilution.

† Write Oregon Agricultural College for particulars in the preparation of self-boiled lime-sulphur.

‡ Three pounds bluestone, four pounds lime, fifty gallons water.

of apples), tobacco (nicotine sulphate) 1-1200 should be added. Compared with past years, we have made a reduction in the strength of lime-sulphur to be used, and further experimental evidence will probably permit the making of greater dilutions for this application. The spray should be applied when the average fruit spurs show the condition as given in Figure 1. In orchards where lime and sulphur has been regularly used in the control of apple scab for several years, mildew is incidentally kept in check by this fungicide. The trouble is usually more pronounced in young unsprayed orchards or in sections where lime-sulphur has not been extensively employed. In orchards where the disease is prevalent it can be more specially brought under control by adding iron sulphide mixture 10-100 to the lime-sulphur. The fungus which causes powdery mildew begins activities as soon as the foliage appears in the spring, and demands the same attention in controlling it as does apple scab.

3. **Pink Spray.** The pink spray is employed chiefly for the control of apple scab. In sections where the bud moth is present arsenate of lead used in the standard dilutions should be added to the lime-sulphur. Owing to the fact that the entire developing apple cannot be completely covered with spray, and thereby given complete protection, until the young fruits have separated in the clusters, this spray should be delayed until the condition found in Figure 2 presents itself. In large orchards, however, it will not be possible to wait until all of the spurs are in this condition. The orchardist should arrange his spraying so that the greatest proportion of the crop is sprayed while in this condition. If mildew is severe add the iron sulphide mixture.

4. **Calyx Spray.** All orchardists are familiar with the value of applying arsenate of lead at this period in the development of the young apple. Apply the spray a few days following the dropping of the petals, as shown in Figure 3. Owing to the fact that it is necessary to protect the fruit from further scab infection, lime-sulphur must be used. In orchards where mildew control is a problem, continue the use of the iron sulphide mixture.

5. **Ten-Day Spray.** The so-called ten-day or two-weeks spray is primarily used for furthering scab protection. It is through the use of this application and the following one that "shot fungus" or the appearance of numerous scab spots on the fruit, usually early in July, is prevented. It is a very important spray during most seasons and must not be omitted.

6. **Thirty-Day Spray.** This application is made just previous to the hatching of the first brood of codling moth and is therefore a very important application. During certain seasons it is necessary to use a spray in order to prevent further scab development. The use of lime-sulphur is dangerous at this time, due to the possibility of burning, and before using it consult with the nearest investigator. We have been experimenting for two seasons with self-boiled lime-sulphur in this application



FIGURE 2—Pink Spray.



FIGURE 3—Calyx Spray.

and the preceding, and the results that have been obtained are very encouraging. Scab control has resulted with practically no fruit burn. The greatest difficulty so far encountered is that of preparation. Both the lime and the sulphur must be of good quality or the resulting product will contain many fine particles which clog up the nozzle. The work which is to be continued along this line during the coming season will clear up many of the difficulties so far encountered in the use of self-boiled lime-sulphur. For the preparation of this material write the Oregon Agricultural College, Corvallis.

7. **July Spray.** This application is

needed in some sections of the state for the control of codling moth. Keep in touch with your fruit inspector or investigator. At Hood River and most of the interior apple districts the hatching of the second brood of worms does not take place until August. During some seasons the green and woolly aphids become injurious during this month. Watch them closely and if they become injurious spray.

8. **August Spray.** In many sections of the Northwest the lead spray for the control of the second brood of codling moths must be applied during this month. The exact date can only be determined by carefully conducted breeding observations, carried on by one familiar with the insect's activities. If your section is badly infested with worms, get an expert to carry on some breeding studies. To be effective during the time the eggs are hatching the spray must be applied at a time not to exceed a few days before the hatching of the first eggs, or the spray will lose its effectiveness before the later eggs are hatched. A lead spray at this time of the year is entirely effective for a period not to exceed 21 to 25 days. If an application, therefore, is applied a couple of weeks before the eggs begin to hatch its extended effectiveness is greatly reduced. During some seasons eggs continue to hatch for a month or more, with a result that it is very essential to put the spray on at just about the right time. Bordeaux 3-4-50 can be added to the arsenate of lead. This, however, is only advised in orchards where anthracnose is causing considerable damage. Bordeaux has a tendency to mottle red apples, due to the fact that the sunlight is prevented from reaching the surface of the fruit and the apples do not color uniformly.

9. **Fall Spray.** For the control of anthracnose the fall application of bordeaux mixture should immediately follow the harvesting of the fruit. If this disease is once put under complete control in a given district, spraying every other year thereafter has been found sufficient in the Hood River sections to keep the trouble in check. This would probably be true of the activities of the disease in other sections. Spores become active following the early fall rains, and to get complete control the application should be made before these occur.

DILUTION TABLE FOR LIME-SULPHUR AT DIFFERENT DEGREES BEAUME*

(This table is prepared considering lime-sulphur at 32° Beaume as standard. Concentrates testing higher or lower are arranged so that they will contain the same amount of sulphur in the diluted spray.)

Degrees Beaume	Delayed Dormant Spray	Pink Spray	Calyx Spray	Ten-Day Spray	Thirty-Day Spray
36.....	1 to 28.3	1 to 34.1	1 to 40.0	1 to 45.6	1 to 57.4
35.....	1 to 27.5	1 to 33.1	1 to 38.8	1 to 44.2	1 to 55.6
34.....	1 to 26.7	1 to 32.1	1 to 37.5	1 to 42.8	1 to 53.7
33.....	1 to 25.8	1 to 31.0	1 to 36.2	1 to 41.3	1 to 51.9
32.....	1 to 25.0	1 to 30.0	1 to 35.0	1 to 40.0	1 to 50.0
31.....	1 to 24.2	1 to 28.9	1 to 33.7	1 to 38.6	1 to 48.2
30.....	1 to 23.3	1 to 27.8	1 to 32.3	1 to 37.1	1 to 46.4
29.....	1 to 22.5	1 to 26.7	1 to 31.0	1 to 35.6	1 to 44.5
28.....	1 to 21.6	1 to 25.7	1 to 29.7	1 to 34.2	1 to 42.7
27.....	1 to 20.8	1 to 24.5	1 to 28.3	1 to 32.8	1 to 41.0
26.....	1 to 20.0	1 to 23.5	1 to 27.0	1 to 31.3	1 to 39.0
25.....	1 to 19.1	1 to 22.4	1 to 25.7	1 to 30.0	1 to 37.2
24.....	1 to 18.3	1 to 21.3	1 to 24.3	1 to 28.7	1 to 35.4
23.....	1 to 17.4	1 to 20.2	1 to 23.0	1 to 27.2	1 to 33.5
22.....	1 to 16.5	1 to 19.0	1 to 21.6	1 to 25.8	1 to 31.7
21.....	1 to 15.8	1 to 18.1	1 to 20.3	1 to 24.5	1 to 30.0
20.....	1 to 15.0	1 to 17.0	1 to 19.0	1 to 23.0	1 to 28.2

* This table was kindly prepared by Mr. R. H. Robinson, Assistant Chemist, Oregon Experiment Station.



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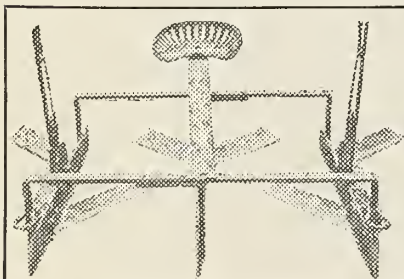
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Air Storage Houses

By W. H. Wilson, Nampa Orchard Company, Kuna, Idaho

THE necessity for suitable storage for fruit has occupied the minds of growers in the last year to a great extent. It was known early in the season that there would likely be a shortage of cars, and from the experience of a great many shippers in past years the practice of shipping fruit to the central markets as fast as packed was a bad one, first, on account of the expense incurred in handling and storage at that end, and secondly, such a practice has always caused a glutted market, thus depressing the prices of packed fruit.

More local storage plants over the Northwest will enable growers to get more in touch with communities where in ordinary years fruit, and especially apples, is very scarce and high, which places are not supplied by the large central markets. Local storage plants will also tend to regulate the supply of fruit to the large markets more in relation to the demand, thereby holding prices normal. Ice storage or refrigeration plants are impracticable for the average grower, from the standpoint of cost and maintenance.

Within the last few years air storage has been given a fair trial and from every standpoint has proven a practical solution of the storage problem. The right amount of ventilation or the perfect circulation of air is perhaps the most essential feature of air storage. Apples held in a storage where there is a free circulation of fresh, cool air will hold up longer than when stored in an artificial cold, and during the frequent changes of weather the temperature of the storage can be maintained at the right degree if the ventilation system is adequately provided for; therefore a system that draws fresh air down under the floor and then up through the tiers of fruit and out at the top of the storage must be the right kind of circulation.

In the discussion of air storage in detail I will refer to the plants constructed by the Wilson Orchard Company on Eagle Heights in Nampa and also at Kuna this year, as I am more familiar with the way they were planned and built. In the construction of these plants a government bulletin was closely followed. The excavation was made as for an ordinary basement, except that dirt was carried out at each end of the excavation, and the slopes thus made were later used for entrance to driveway. Our storages as built last fall are 40x60 feet, with an average depth of 3 feet below ground level. Within this excavation was constructed the framework of heavy timbers to support the heavy weight of the dirt roof. The side studding is constructed of 2x8, 8 feet to the plate from floor of basement, spaced 2 feet apart. The bottom rafters are 2x10 inches, 16 feet, spaced 16 inches apart; the top rafters are 2x10 inches, 10 feet, spaced 16 inches. Four lines of bridging help support the roof. The main supports are four rows of posts 10 feet apart through the length of the building; the center two rows are 6x6, 12 feet high, with 4x12 girder on top; the row of posts on either side of center row are 4x6, 10 feet, with a 4x12 girder on top. Every post is braced to the roof each way and in all the frame is sufficiently strong to support the great weight of the dirt roof. The frame is then covered with a medium weight of field fence wire from the ground up over the roof and ends to the plate on the ends. Above the top line of the door where no dirt could be banked the building was boxed and this filled in with straw chaff tightly packed. The ventilators were next placed. There are twelve cold air vents, six on a side. These were built 12 feet long, 16x20 inches at the top and 12x20 inches at the bottom, and were then set in holes dug down to the bottom of the basement on the outside of the frame of the building. With the building covered, these stick up above the roof about three feet. Each vent has a hinged cover on top and by this method the cold air is drawn through this 12-foot chimney, so to speak, down to below the floor level. There are four ventilators on the top of the storage equally spaced, which complete the air circulation. These stick up above the roof when covered about two feet. They are two feet

SERVICE DEPARTMENT OF THE Corona Chemical Company

Manufacturers of "Corona Dry" Powdered Arsenate of Lead.

OUR POLICY

Our Policy is paraphrased in what Major General Leonard Wood, U. S. A., said of a small university in Vermont: "The splendid thing about Norwich is, she has always kept the faith."

ASSURED PROTECTION is what a grower wants when he buys Arsenate of Lead. He must think in terms of protection, not in cents per pound, when he buys his season's requirements. The fruit growers of the Northwest cannot be lured into believing that a cheap and low grade Arsenate of Lead--even though well sprayed--will give certain and adequate insect control.

EXCESSIVE FINENESS NECESSARY. - If the Arsenate of Lead being used is not of excessive fineness THEN IT IS IMPOSSIBLE TO PROPERLY APPLY IT. No matter how careful a man may be with the spraying rod, if he hasn't material that will give proper distribution, he cannot get good results; and regardless of how cleverly he may handle the rod, he won't get complete and uniform distribution unless he has "Corona Dry" Quality.

A CARELESS SPRAY OPERATOR may get a good application if he has the best materials, but a careless operator can never get a good application with poor material. Control means greatest care in all ways and with "Corona Dry" Arsenate of Lead to start with, a good application--one that will control the worms--can be made.

PURITY AND FINENESS. - The results of careful application depend entirely upon the fineness and purity of the material, because excessive fineness means greater covering power, more complete and uniform distribution, and consequently better insect control.

DON'T RUN CHANCES WITH YOUR CROP. - You may use a poor-quality and cheap Arsenate of Lead and get through the season with only a small percentage of worms, but this chance depends on there being no worms. If an infestation occurs "YOU HAVEN'T GOT A CHANCE"--except with "Corona Dry" quality.

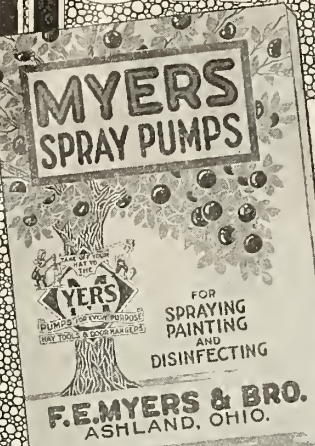
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Spokane Seed Company
SPOKANE, WASH.

Portland Seed Company
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HOW AND WHEN TO SPRAY



MYERS SPRAY PUMPS

FOR SPRAYING PAINTING AND DISINFECTING

F.E. MYERS & BRO.
ASHLAND, OHIO.



MYERS & BRO.
ASHLAND, OHIO.


Myers Automatic Triple Power Spray Outfit

Patented with Automatic Triple Pump

Capacity 100 Gallons

Net Weight 100 lbs.

Price \$10.00



MYERS & BRO.
ASHLAND, OHIO.

FORMULAE

For the control of various diseases and insects on fruit trees and shrubs.

1. **FUNGICIDES**

2. **INSECTICIDES**

3. **HERBICIDES**

4. **STIMULANTS**

5. **ANTIFROST**

6. **ANTIBLISTER**

7. **ANTIBURN**

8. **ANTIRIP**

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19. **ANTISWELL**

20. **ANTISWELL**

Those neglected fruit trees—you will find them everywhere—perhaps you have them in your own yard or out in the orchard, that for some reason or other you have failed to take care of in years gone by and now class them as non-producers, worthless except for shade.

You are surely going to give them attention this spring, as well as every other tree, vine, shrub, bush or plant about the place, on which you depend for your fruits, berries and vegetables. Start early with this work, before gardening and planting time. Trim up your trees and plants and put new life into them, so they will amount to something and do their bit when the time comes.

Whether you raise fruits or vegetables, you will need a spray pump of some kind, so we recommend the MYERS LINE of Bucket, Barrel and Power Spray Pumps to your attention—the Easy Operating Cog Gear Bucket and Barrel Pumps for hand use, and the Myers Automatic Power Pumps and Complete Outfits that do not require a relief valve for extensive power operations.

Go where you will, you will find these Spray Pumps doing things in the spraying world—spraying trees and plants, whitewashing and painting, disinfecting and innumerable other jobs—because they are recognized for their easy operation, speed, capacity and economical use of mixtures, and for these reasons are the choice of fruitmen and gardeners everywhere—veteran or novice, you will appreciate the efficient spraying service of Myers Spray Pumps.

Ask your dealer or write us immediately about them—time is limited until you must get busy, and when you start we want you to have a real fighting machine in a Myers Spray Pump.

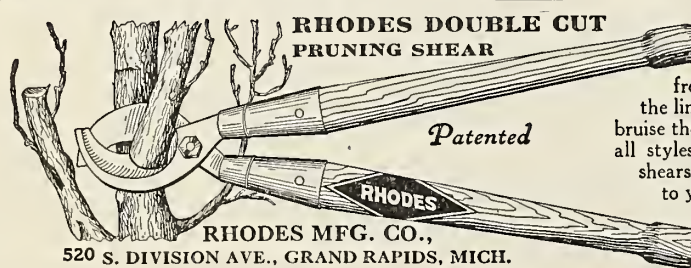
Beautiful catalog by return mail on request.

For Quick Attention Address Your Letter or Card,
Spray Pump Department, No. 120 Orange Street.

Pumps for Every Purpose, Hay Unloading Tools, Door Hangers

Albany, Harrisburg, Milwaukee, Cedar Rapids, St. Louis, Kansas City

F.E. MYERS & BRO.
120 ORANGE ST. ASHLAND, OHIO.



RHODES DOUBLE CUT PRUNING SHEAR

Patented

RHODES MFG. CO.,
520 S. DIVISION AVE., GRAND RAPIDS, MICH.

THE only pruner made that cuts from both sides of the limb and does not bruise the bark. Made in all styles and sizes. All shears delivered free to your door.

Write for circular and prices.

square and equipped with two shutters spaced two feet apart in the ventilator, which are opened or closed by a single rope from below.

The sides and roof being covered with wire netting, they were then covered with a heavy layer of straw, evenly distributed, and then covered with four or six inches of dirt. The dirt was hoisted by the use of a hay derrick and a specially made box with a trip bottom, which facilitated the work.

The floor of the storage was constructed with 2x4's laid in rows on the dirt floor flat, with 8-inch pieces of 2x4 set upright for posts and another row of 2x4's laid flat on top. There is about 20 inches between these rows, which allows us to tier the packed boxes so as

to economise in space. This flood construction raises the apples a foot from the dirt floor and allows free circulation of air under and up through the tiers. With plenty of room in such a storage, the tiers would be six high and fourteen deep for convenient handling. There is room in the above described storage for seventy-two tiers of eighty-four boxes. However, this year we tiered eight and nine high and utilized all the space in the ten-foot driveway through the building. Two sets of doors are provided at each end of the storage and three thermometers, one near each end of the building and one in the middle.

We are able to raise or lower the temperature several degrees in a very

short time by the regulation of the ventilators; the temperature ranges from 32 to 40 degrees. On examination of several boxes of Winesap and Rome Beauty apples a few days ago I found them in excellent shape.

Savory Stews

Try them. They can be a whole meal and a nutritious one. These recipes serve five people. Here is an English stew that is especially good:

Hot Pot of Mutton and Barley.—1 1/2 pound mutton, 1/2 cup pearly barley, 1 tablespoon salt, 4 potatoes, 3 onions, celerly tops or other seasoning herbs. Cut the mutton in small pieces and brown with the onion in fat cut from meat. This will help make the meat tender and improves the flavor. Pour this into a covered sauce pan. Add two quarts water and the barley. Simmer for 1 1/2 hours. Then add the potatoes cut in quarters, seasoning herbs, and seasoning, and cook one-half hour longer.

Beef Stew.—1 pound beef, 4 potatoes cut in quarters, 1/4 peck peas or 1 can, 1 cup carrots cut up small, 1 teaspoon salt. Cut the meat in small pieces and brown in the fat from the meat. Simmer in two quarts of water for one hour. Add the peas and carrots and cook for one-half hour, then add the potatoes. If canned peas are used, add them ten minutes before serving. Serve when potatoes are done.

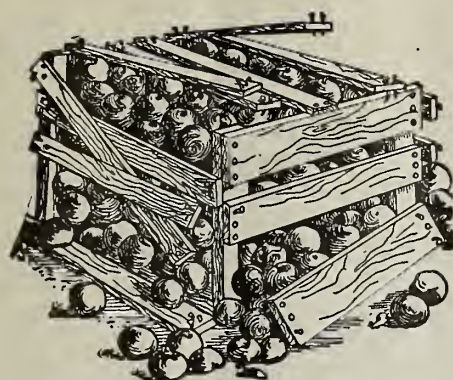
Meat Pies.—Another good way to use a little meat. Have you ever used rice, cornmeal mush or hominy for a crust? This is less work than a pastry crust and saves wheat: 4 cups cooked cornmeal, rice or hominy; 1 onion, 2 cups tomato, 1/2 teaspoon pepper, 1 tablespoon fat, 1 pound raw meat or left-over meat cut up small, 1/2 teaspoon salt. Melt the fat, add the sliced onion and, if raw meat is used, add it and stir until the red color disappears. Add the tomato and seasoning. If cooked meat is used, add it with the tomato and seasoning, after the onion is browned, and heat through. Grease a baking dish, put in a layer of the cereal, add the meat and gravy, and cover with the cereal dotted with fat. Bake for half an hour.

Get rid of the rats and gophers and all unnecessary pests that destroy the crops.

Do not fail to spray for fungus, commonly called scab. In some sections two sprays are enough, but in wet climates of the Northwest it is usually necessary to put on the semi-dormant, the pink, one in the calyx, one in two weeks after, according to weather conditions.

Many do not understand why the Allies do not eat some flours and meals which we are asked to eat. One reason is that many of them are apt to become wormy in shipment abroad.

The food situation among our Allies is grave, yet there will be plenty in America to spare, if we conserve more and increase production.



BEFORE using Cement Coated Nails

Western Cement Coated Nails for Western Growers

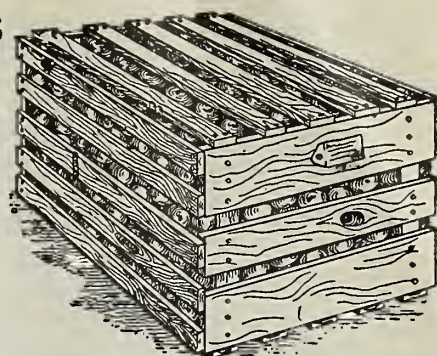
Our Cement Coated Nails are always of uniform length, gauge, head and count. Especially adapted to the manufacture of fruit boxes and crates. In brief, they are the Best on the Market.

Write for Growers' testimonials.

Colorado Fuel & Iron Co.

DENVER, COLORADO

Pacific Coast Sales Offices
Portland, Spokane, San Francisco
Los Angeles

AFTER use of C. F. & I. Co.'s
Cement Coated Nails

Hood River Apple Prices Highest Since 1911

[Hood River News, March 13, 1918]

DESPITE the unfavorable conditions created by the war, prices received for apples this year by the association have reached the highest mark since 1911, according to the report of General Manager Stone at the members' meeting Saturday. The average price for the three standard grades this year is \$1.40 a box, compared with \$1.13 last year. The low mark was reached in 1915, when the average was 76 cents a box.

The percentages of Extra Fancy,

	1913
Apples	575,500
Pears	12,800
Peaches	1,100
Cherries	10,026
Strawberries	61,500
Blackberries	750
Raspberries	14
Plums and prunes	50
Crab apples	None
Loganberries	None
Gooseberries	None
Currants	None
Quinces	None
Total packages	661,740

While there is larger variation in the amount of fruit handled in the different years by the association, the percentage handled to that grown in the Valley has not changed materially, as the years that show a small amount of tonnage were the years in which the crop was small.

	1913
Extra Fancy	37
Fancy	43
"C" Grade	20
4 tier	58
4½ tier	28
5 tier	14

The following is a list of prices received to date on the principal varieties of apples. These figures will vary somewhat when the returns are all in. Prices quoted are the average per box price which have been received to date

Experienced Orchardist

with record for success, open for employment as superintendent March 15. Can handle workmen advantageously. Thoroughly reliable. In position to go anywhere.

Box 134, Darby, Montana

Fancy and "C" grades are as follows: Extra Fancy, 52 per cent; Fancy, 32 per cent; "C" grade, 16 per cent. The percentage in tiers were as follows: 4 tier, 40 per cent; 4½ tier, 36 per cent; 5 tier, 24 per cent.

Comparative Statement of Yield for Years 1913 to 1917, Both Inclusive.

A comparative statement of the number of packages of fruit handled by the association for the past five years is as follows:

	1914	1915	1916	1917
Apples	545,800	373,200	979,741	646,787
Pears	12,156	24,797	38,154	18,135
Peaches	175	407	88	None
Cherries	7,862	7,826	9,047	8,401
Strawberries	84,390	87,495	85,200	48,876
Blackberries	496	403	102	105
Raspberries	147	119	20	61
Plums and prunes	617	249	75	71
Crab apples	186	274	205	137
Loganberries	10	10	9	1
Gooseberries	8	9	4	3
Currants	15	17	None	None
Quinces	None	29	15	2
Total packages	651,842	494,834	1,112,660	722,579

In order that we may become familiar with the crop conditions and thereby put ourselves in a position to correct the errors of past years, we give below a table showing the percentages of Extra Fancy, Fancy and "C" grade for five years last past, and also the percentage of tiers handled by the association:

	1914	1915	1916	1917
Extra Fancy	37	30	38	52
Fancy	43	37	37	32
"C" Grade	20	33	25	16
4 tier	57	64	42	40
4½ tier	31	23	37	36
5 tier	12	13	21	24

on the different varieties, grades and sizes specified. The per cent column shows the portion of the varieties, grades and sizes collected for to date:

Spitzenburg			
Extra Fancy	Price	Per Cent	
4 tier	\$1.76	83	
4½ tier	1.56	78	
5 tier	1.31	21	
Fancy			
4 tier	1.56	80	
4½ tier	1.35	64	
5 tier	1.16	36	
"C" Grade			
4 tier	1.31	90	
4½ tier	1.11	90	
5 tier91	70	
Average	\$1.45	70	

Total crop of Spitzenburgs handled, 222,695 boxes. Charges: Commission, 10 cents; storage, 8 cents; advertising fund, 2 cents; and purchasing fund, 1 cent.

Newtowns

Extra Fancy	Price	Per Cent
4 tier	\$1.57	59
4½ tier	1.37	36
5 tier	1.17	1
Fancy		
4 tier	1.37	62
4½ tier	1.22	30
5 tier	1.02	1
"C" Grade		
4 tier	1.17	63
4½ tier	1.02	41
5 tier87	1
Average	\$1.39	35

Wanted, Apple Orchard Assistant Superintendent

Having Eastern practical experience. Must have ability to handle men.

Turkey Knob Orchard
Mt. Jackson, Shenandoah Co., Va.

Throws a Cloud of Spray

The Hardie Orchard Gun saves your time and muscle—no long, heavy rods to hold.

Turns a big job into a little one. One man with a Hardie Gun will do more work and do it better than two men with the old-fashioned rods.

Hardie Orchard Gun \$12

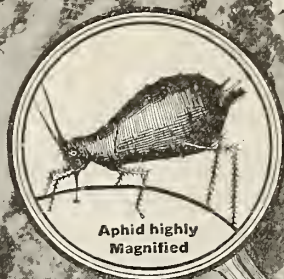
Low price made possible by big production—send for the Hardie Catalog today. Hardie Sprayers and spraying devices standard for 18 years.

THE HARDIE MFG. CO.
Hudson, Mich.
Also Portland, Ore.

Kill Aphis

Before Aphis Kills Your Profits

This tiny, sap-sucking insect, scarcely larger than a pin-head, is destroying apple profits all over the country. Feeding with its sharp, mosquito-like bill, it causes dwarfed, deformed, unmarketable fruit. Curls foliage. Weakens trees. Spray with



Black Leaf 40

40% NICOTINE

and control Aphis, Red Bug, Leaf Hopper and other soft-bodied, sucking insects. Aphis is making its appearance in many sections for the first time. Regarded by many growers as the most destructive apple insect. One aphid produces thousands in a few weeks. Spray with Black Leaf 40 and save your profits. Can be used with lime-sulphur, arsenate of lead, bordeaux and other sprays as recommended, or may be used separately, if desired. Mixes perfectly with water. Costs only about 1c per gallon diluted for the trees. Recommended by agricultural colleges and experiment stations. Send for **Free Spray Chart and Leaflets** showing when and how to spray and how to protect fruit trees, vines and vegetables from these profit-killing insect pests.

The Kentucky Tobacco Product Co.

Incorporated

Louisville, Kentucky

Total crop of Newtowns handled, 275,384 boxes. Charges: Commission, 10 cents; storage, 8 cents; advertising fund, 2 cents; purchasing fund, 1 cent.

Arkansas Blacks

Extra Fancy	Price	Per Cent
4 tier	\$2.00	21
4½ tier	1.80	24
5 tier	1.45	32
Fancy		
4 tier	1.80	66
4½ tier	1.60	67
5 tier	1.20	11
"C" Grade		
4 tier	1.35	90
4½ tier	1.15	90
5 tier	.95	10
Average	\$1.64	37

Total crop of Arkansas Blacks handled, 15,078 boxes. Charges: Commission, 10 cents; storage, 8 cents; advertising fund, 2 cents; purchasing fund, 1 cent.

Ortleys

Extra Fancy	Price	Per Cent
4 tier	\$1.74	72
4½ tier	1.54	67
5 tier	1.29	1

HOMES AND FARMS



IN THE "SUNNY SOUTH"

Nature has blessed this favored section with mild, healthful climate, productive soil and all that makes life worth living. You can buy good farm land in Virginia, W. Va. and North Carolina at \$15 per acre and up. Fruit, truck, poultry and general farming will prove successful here. Write for information, illustrated literature, etc.

F.H. LaBaume, Ag. & Ind. Agt., N. & W. Ry. 228 Ry Bdg. Roanoke, Va.

Fancy	Price	Per Cent
4 tier	\$1.54	72
4½ tier	1.34	84
5 tier	1.14	3
"C" Grade		
4 tier	1.29	83
4½ tier	1.09	90
5 tier	.89	20
Average	\$1.58	69

Total crop of Ortleys handled, 32,464 boxes. Charges: Commission, 10 cents; storage, 7.8 cents; advertising fund, 2 cents; purchasing fund, 1 cent.

Red Cheeks

Extra Fancy	Price	Per Cent
4 tier	\$1.75	81
4½ tier	1.55	60
Fancy		
4 tier	1.55	27
4½ tier	1.35	24
"C" Grade		
4 tier	1.25	38
4½ tier	1.05	32
5 tier	.85	1
Average	\$1.54	33

Total crop of Red Cheeks handled, 5,956 boxes. Charges: Commission, 10 cents; storage, 8 cents; advertising fund, 2 cents; purchasing fund, 1 cent.

Jonathans

Extra Fancy	Price	Per Cent
4 tier	\$1.34	1.34
4½ tier	1.23	1.23
5 tier	1.10	1.10
Fancy		
4 tier	1.20	1.20
4½ tier	1.08	1.08
5 tier	.95	.95

"C" Grade	Price
4 tier	\$1.05
4½ tier	.94
5 tier	.84

Average price \$1.08

Total crop of Jonathans handled, 25,107 boxes. Charges: Commission, 10 cents; storage, 5.5 cents; advertising fund, 2 cents; purchasing fund, 1 cent.

Delicious

Extra Fancy	Price
4 tier	\$1.98
4½ tier	1.73
5 tier	1.33
Fancy	
4 tier	1.73
4½ tier	1.48
5 tier	1.13
"C" Grade	
4 tier	1.38
4½ tier	1.13
5 tier	.88

Average price \$1.666

Total crop of Delicious handled, 2,620 boxes. Charges: Commission, 10 cents; storage, 7 cents; advertising fund, 2 cents; purchasing fund, 1 cent.

Winter Bananas

Extra Fancy	Price
4 tier	\$1.93
4½ tier	1.73
5 tier	1.33
Fancy	
4 tier	1.68
4½ tier	1.48
5 tier	1.13
"C" Grade	
4 tier	1.23
4½ tier	1.08
5 tier	.93

Average price \$1.60

Total crop of Winter Bananas handled, 7,381 boxes. Charges: Commission, 10 cents; storage, 5.4 cents; advertising fund, 2 cents; purchasing fund, 1 cent.

Oregon Reds

Extra Fancy	Price
4 tier	\$1.57
4½ tier	1.39
5 tier	1.09

Average price \$1.47



KEEP BEES!

**HONEY IS THE BEST
SUBSTITUTE FOR SUGAR
and is more Wholesome
and Delicious**

If you own an orchard or keep bees, you should have a copy of our Catalog. It lists everything for the successful handling of bees and the production of honey.

We are pioneers in the bee supply business in the Northwest, are thoroughly familiar with local requirements and carry a large and complete stock.

Ask for Catalog No. 204

You can keep bees any place where they can forage within a mile.



Total crop of Oregon Reds handled, 3,562 boxes. Charges: Commission, 10 cents; storage, 8 cents; advertising fund, 2 cents; purchasing fund, 1 cent.

Miscellaneous Varieties

The average price received on the miscellaneous varieties not listed above, for the three standard grades, consisting of 21,333 boxes, is \$1.15 per box. Paid 68 per cent.

To recapitulate, the following are the prices received by the association for the following varieties and grades, respectively:

	Extra Fancy	Fancy	"C" Grade
Spitzenburgs	\$1.62	\$1.43	\$1.15
Newtowns	1.49	1.32	1.10
Arkansas Blacks	1.73	1.69	1.26
Ortleys	1.69	1.49	1.23
Red Cheeks	1.68	1.47	1.17
Jonathans	1.19	1.05	.92
Delicious	1.86	1.59	1.20
Winter Bananas	1.88	1.64	1.18
Oregon Reds	1.47

Returns to March 1, 1918, have been received on 55 per cent of the crop, viz.: \$517,034.91 in settlement of 367,827 boxes of apples, or an average on all varieties, grades and sizes on which the association has received payment, of \$1.40 per box, against a like average a year ago of \$1.17 per box, with 55 per cent of the crop paid for this year against 47½ per cent paid for at the same time last year.

The percentage of grades on which we have received pay up to the present time is as follows: Extra Fancy, 51 per cent; Fancy, 59 per cent; "C" grade, 73 per cent.

The percentage of tiers on which we have received pay up to the present time is as follows: 4 tier, 74 per cent; 4½ tier, 60 per cent; 5 tier, 23 per cent.

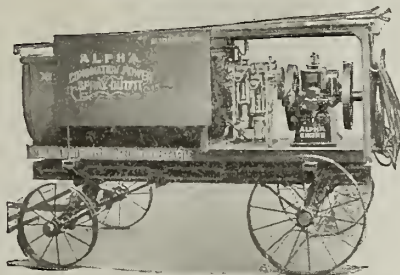
In considering the returns this year it is well for us to investigate the returns we have received for previous years. We therefore give below a statement of the amount received by the association from its organization down to the present time, which is as follows:

Past Averages Are Given

For the 1913 crop the average price of the three standard grades was \$1.23, for 1914 76 cents, for 1915 \$1.27, for 1916 \$1.13, and for 1917 for the fruit

ALPHA POWER SPRAYERS

EFFICIENT SIMPLE DURABLE



THE ALPHA possesses every feature necessary for quick efficient spraying. No complicated parts to give trouble. The Alpha is easy to handle, compact and strong. Five sizes, including Triplex and Duplex Pumps.

It's Time to Spray—Do the Job Well

If you have no sprayer or your old machine is not capable of good effective work **YOU NEED A NEW ALPHA SPRAYER.** The quality of your product is at stake.

Don't Buy An Outfit Until You Investigate the Alpha

Constant Pressure The Alpha Automatic Pressure control holds the pressure steadily at any desired point. No part of this regulator is exposed to the corrosive action of the spray solution. Engine runs idle when not spraying. All parts of pump readily accessible and replacements easily made.

A Reliable Engine The Alpha is perfectly balanced and delivers a smooth flow of economical power to the pump. Requires practically no attention and is insurance against expensive delays when spraying. Magneto equipped. No batteries needed. Starts easily without cranking.

SEND FOR COMPLETE DESCRIPTION

OUR STOCK IS COMPLETE — IMMEDIATE SHIPMENT

Shipments made from Seattle, North Yakima, Portland or Wenatchee.

De Laval Dairy Supply Co.

61 Beale Street, SAN FRANCISCO, CAL.

on which we have received pay up to the 1st of March (being 55 per cent of the crop) \$1.40 per box. These are the highest returns received in the Valley for the crop since 1911. This could only be accomplished by the best of teamwork and the fact that we have in the different districts in which we have representatives men who are especially adapted and fitted to secure the best results in those markets.

Amount of Business Is Shown

The amount of business done by the association for the season of 1917, commencing with June 1, 1917, and May 31, 1918 (from March 1 to May 31, 1918, being estimated), is as follows:

Stores	\$250,000.00
Apples	875,000.00
Strawberries	118,960.12
Pears	31,103.02
Cherries	14,045.85
Raspberries	111.42
Loganberries	1.75
Gooseberries	1.35
Prunes and plums	30.49
Blackberries	181.06
Crabapples	182.27
Quinces	4.76
Ice	8,400.00

Total.....\$1,298,022.09

The amount of business done by the association for the four years last past was as follows, viz.: 1914, \$671,559.82; 1915, \$947,754.73; 1916, \$1,609,295.50; 1917 (part estimated), \$1,298,022.09.

MORE WORK FROM YOUR HORSES

The use of collar pads is humane. Again, your horses will do more work if properly protected by the right kind of pad. TAPATCO is the right kind.

A NEW AND BETTER HOOK ATTACHMENT

Consisting of wire staple, reinforced with felt washer (note where arrows point). This gives the hooks a better hold and prevents pulling off. The weakest point is made strong and life of pad greatly lengthened.

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Pat. in U. S. Dec. 4, 1914.
Pat. in Can. Apr. 6, 1915.

BETTER FRUIT

PORTLAND, OREGON

Official Organ of The Northwest Fruit Growers' Association
A Monthly Illustrated Magazine Published in the
Interest of Modern Fruit Growing and Marketing
All Communications Should Be Addressed and Remittances
Made Payable to

Better Fruit Publishing Company

E. H. SHEPARD, Editor and Publisher

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ADVERTISING RATES ON APPLICATION

Entered as second-class matter December 27, 1906, at the
Postoffice at Hood River, Oregon, under Act
of Congress of March 3, 1879.

Cold Storage.—A very instructive article giving directions for the erection of a cool storage warehouse appears in this edition, which will be of much interest to a great many growers. It is very evident from past years' experiences, and particularly 1917, there is very apt to be a shortage of cars, therefore it is up to the growers to protect themselves by having the proper storing facilities to prevent the deterioration of apples while awaiting shipment. It is also true that a great many of the shipping concerns have cold storage plants whose capacity is not sufficient to care for the entire crop of the district where there is a shortage of cars. Consequently it seems wise to suggest that the growers should protect themselves to the fullest extent possible. This they can do by erecting cool storage warehouses, and although the Editor has never seen the Wilson storage warehouse, the Wilson orchard is a very large one near Boise, and without any doubt his directions for a cool storage plant will be found very practical and advisable. Even when cars are supplied in ample quantities, it is important that the whole crop should not go on the market at once, for the reason that when the shipments are too heavy the markets become glutted and prices are demoralized, so the grower as well as the association must be protected by sufficient and proper holding capacity for carrying the apples so they will keep in first-class condition and not deteriorate in any way by becoming overripe or scalding. Changes in temperature affect the keep of apples more than any other one particular thing, except exceedingly high temperature. With good cool storage plants or cold storage plants a temperature can be regulated and maintained moderately even. In addition to this, during the coming year, with the shortage of cars

prevailing, which is very likely, it is going to be necessary for fruit growers to be equipped with considerable excess warehouse capacity or cool storage plants in their own orchards, for the reason that those belonging to your shipping organization may not be sufficient to care for the whole crop.

Abuse of Water on Fruit and Trees, by D. F. Fisher, Office of the Fruit Disease Investigations, Department of Agriculture, is one of the most important articles that has appeared in BETTER FRUIT for a long time, for the particular reason that it deals with a subject less understood, *re* the abuse of irrigation on fruit and trees. While growers have been troubled for many years with a disease in some sections called rosette, and in other sections winter kill or die back, a great many growers have not understood the cause of this disease. Other troubles like Jonathan spot, drouth spot, Baldwin spot and cork rot have been more or less prevalent over the Northwest for a number of years. A number of reasons have been assigned for the cause, but the real causes have not been thoroughly understood by many of the growers. The effect of excessive watering, lack of watering, or too long intervals between watering is in a large measure responsible for these troubles. The article embraces a research experiment work carried on by Mr. Fisher for a period of years and is very valuable because he arrives at some very definite conclusions. It is one which every grower should read, because it is very evident that by the proper use of water and other suggestions made in this article most of these diseases are troubles that can be eliminated and in nearly every case they can be controlled.

Small Apples.—The prices on 4 and 4½-tier apples have been very satisfactory this year in nearly all districts, taking into consideration conditions with which marketing concerns have had to contend with. But prices on small apples like 5-tier, and particularly smaller sizes than 5-tier, are not very encouraging and pay the grower very little, if any, profit. While sellers succeeded in getting fair prices for small apples this year, even though no export, it must be borne in mind that the crop in the East was considered very light, especially in New York State, so it looks reasonable to assume the crop in the East will be large next year, and the wisest thing for the fruit grower to do in the West who has apples to ship East is to produce as much size as possible by proper pruning and thinning, and keep his apples growing by maintaining a good soil moisture condition with sufficient supply of irrigation water throughout the season.

This year's prices on small sizes and ordinary varieties should certainly teach a lesson to the fruit grower. If every fruit grower who will take the pains to look over his return sheet carefully and figure out his cost of producing, harvesting and packing, will find he has

made very little if any money on very small sizes or ordinary varieties. This is particularly true of the lower grades. It won't take long for any man who can do a little plain arithmetic to find out he could make more money by selling his small sized apples and ordinary varieties, particularly the low grades, to the vinegar factory or to the evaporator. These companies paid pretty fair prices last year. Vinegar apples brought about \$8 per ton in most districts, evaporated apples selling in various districts at different times throughout the year all the way from \$12 to \$18 per ton. Eighteen dollars per ton is nearly 40 cents per box; adding the cost of packing would be about as follows: Boxes 17 cents, packing 5 cents, paper 7 cents, making and nailing up boxes about 2 cents, association or selling organization charges from 10 to 20 cents, making a total of 81 to 91 cents. So it ought to be very evident you can do your own figuring that these varieties have to sell for 80 to 90 cents per box in order to beat out the evaporator prices. You know they won't do it, if you have your returns and look over your prices.

Codling Moth.—The fruit grower must bear in mind, if we have a large crop in 1918, that only clean fruit will bring good money. Therefore it is up to the grower to spray thoroughly and frequently for codling moth. It seems more or less evident from experience and results obtained that in most districts three sprays are not sufficient; many districts requiring four or five sprays. When the growers followed the good old fashioned method, but rather expensive, of spraying every three weeks for codling moth, then the codling moth was a very negligible trouble.

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Please mail me your complete catalog of hand and power sprayers.

No. of trees kind of trees

Name

Address

I am ☐ interested in your Bean Spray Gun.
Please send descriptive literature.

Wrapping Paper.—On account of the increased cost of all kinds of paper, the expense of wrapping apples will be considerably more than in the past. With the increased cost of production and with the uncertainty about increased selling prices, it seems wise to suggest that the different districts endeavor to economize in paper wherever possible, and therefore the following suggestion seems in order, which is being adopted

in some districts, that growers pack their Fancy in plain paper, instead of printed paper, using only printed paper for the Extra Fancy grades. In all probability the Fancy grade will bring as much money in plain paper as it will in printed paper, because the person who buys a box of apples at a moderate price does not desire to pay for any unnecessary fancy trimmings.

Standard Box.—The dimensions of a standard box are contained in a short article appearing in this edition. Every grower should insist upon having standard sized boxes, for the reason that the fruit industry is extending more and more towards standardization in all respects.

A Message for Fruit and Vegetable Growers

There are many millions of dollars worth of Fruit and Vegetables left to rotten on the ground and many more millions of dollars are paid in freight rates, tin cans and boxes that can and must be saved. We will invest some of our own capital, if you wish, as we are sure that it is to our mutual benefit, if you write us today for particulars. All information on this subject will be given cheerfully and free of charge. If you are in business for making the best profits write now.

The A. A. A. Evaporator Manufacturing Co., Inc.

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We desire to get in touch with Fruit and Vegetable Growers in all parts of the country in order to establish Fruit and Vegetable Drying Plants for single firms that want to build new and up-to-date drying plants for themselves and with two or more Growers that would favor the construction of a drying plant on a co-operative basis.

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188 acres; \$100 per acre. Red sandy loam soil. Fine air drainage. 4,000 trees, 500 15-year-old, 1,000 8-year-old, 2,000 4-year-old. 500 peach. Wine Sap, Grimes Golden, York Imperial. Two good dwelling houses, barn and out buildings, full orchard equipment and horses. Changing occupation. Selling at sacrifice. For further details write.

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Martinsburg, West Virginia



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YOUR FRUIT CROP

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BIRMINGHAM

Pacific Coast Land and Industrial Exposition

Jean Loughborough, Director of Publicity.

ONE of the most far-reaching of enterprises ever held west of Chicago has been planned to take place in Oakland, California, opening August 15 and continuing until October 15. It is the Pacific Coast Land and Industrial Exposition, and is planned to include representation both in land and manufacturing industries from Washington, Oregon, Nevada and California. The exposition will be held at the Civic Auditorium in Oakland, which faces beautiful Lake Merritt, and will occupy as well the space surrounding the Auditorium and park of thirty acres. Pavilions will be erected for state and county exhibits, manufactures, automobiles, tractors, livestock and poultry, a stadium where out-of-door events such as "round-ups" will be staged, and an amusement zone. Historic pageants, fireworks and other spectacular events will be given on the lake. Indoors there will be amateur sports in the big arena of the Auditorium, where ten thousand people may be seated at one time. Assembly halls, the theater, the ball rooms, rest rooms, public telephone stations of the Auditorium will be turned over to the visitors.

The exposition will be Mission in architectural style and the buildings will be kept in light gray, while fountains, moss and flowers will beautify the board walks. More than fifteen hundred head of livestock will be housed at one time, and generous space is also being arranged for poultry, displays of fruit and dairy products, miniature farms, rice and strawberry fields.

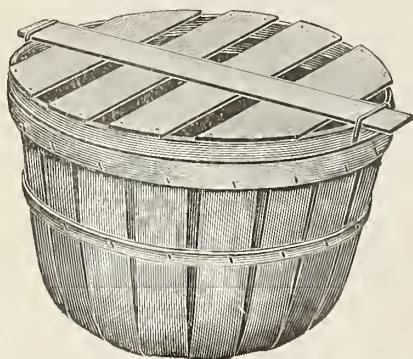
The exposition is planned and fostered by a group of one hundred and forty men of California, identified with the industries and finance of the West, as well as a number of civic workers, and is planned for exploitation of the West. It is not a personal profit-making venture, but a patriotic and philanthropic one, for every assistance is pledged the Federal Government in spreading the food conservation propaganda, as well as public information. There will be special lectures along these lines and demonstrations by public school students throughout the session on special war-time dishes. The headquarters of the exposition are at the Civic Auditorium, Oakland.

UNITED STATES FOOD ADMINISTRATION.
Federal Food Administrator for Washington
Charles Hebbard.

TO FRUIT GROWERS, SHIPPERS, AND ASSOCIATIONS:
After carefully reviewing the work of the joint conference of fruit growers, shippers and box manufacturers from Idaho, Montana, Oregon and Washington, held in Spokane November 24, 1917, I wish to call attention to some very vital points and urge that you co-operate in every way to meet the situation.

The one big problem of the day is labor, and it must be dealt with under present conditions and the conditions confronting the industrial world. The lumber industry has been materially affected by the lack of labor in the woods and, as a result, fewer logs were secured by the mills than in previous years; inefficient labor in mills and factories has had its effect in slowing up production. This, coupled with the fact that the demand for lumber from all sources is gradually increasing, with shipments heavy for this time of year, and that govern-

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BEST
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SUPPLIES**

Keep Bees this Summer
For pleasure and profit. Besides being interesting there is money in bees. Our line is complete. We are agents for LEWIS BEE WARE. Write for catalog and list of Bee Books.

The Chas. H. Lilly Co. Seattle.

ment contracts are being accepted by some of the box-producing mills, prompts me to urge all growers and shippers to co-operate with one another, ascertain their requirements, or at least 80% to 90% of same, and place their orders with the box factories, making arrangements for storage and delivery as soon as cars are available. In this connection I might mention that the Car Service Commission of Washington, D. C., promises no relief from the present situation for next spring and summer. By accepting shipments from now on you are not only protecting yourself from a box shortage, but assuring yourself that your supply will be on hand when wanted.

Standard specifications for the coming year were adopted at the conference after careful consideration, sample containers for all fruits and vegetables being on exhibition, which in no way conflict with state or national laws or vary from containers heretofore used by growers and shippers so far as inside measurements are concerned. The changes deal entirely with the thickness and width of the various pieces used in the construction of a box. These changes appear to work to the best advantage of all concerned in the effort to meet the demand of the coming season. The specifications adopted for the standard apple box are as follows:

Standard Apple Box—Two ends, one or two pieces, $11\frac{1}{2} \times 10\frac{1}{2} \times 1\frac{1}{16}$; two-piece ends securely fastened with three corrugated steel fasteners. Two sides, one piece each, $19\frac{1}{2} \times 10\frac{1}{2} \times \frac{3}{16}$. Two tops, one piece each $19\frac{1}{2} \times 5\frac{1}{4} \times \frac{3}{16}$. Two bottoms, one piece each $19\frac{1}{2} \times 5\frac{1}{4} \times \frac{3}{16}$. Four cleats $11\frac{1}{2} \times 1\frac{1}{16} \times \frac{3}{16}$.

To meet the unusual situation forecasted for 1918, the following exceptions to the standard specifications were permitted in emergencies:

Exception No. 1—Two ends, one, two or three pieces, $11\frac{1}{2} \times 10\frac{1}{2} \times 1\frac{1}{16}$; two or three-piece ends securely fastened with three corrugated steel fasteners at each joint. Two sides, one piece each, $19\frac{1}{2} \times 10\frac{1}{2} \times \frac{3}{16}$. Two tops, one piece each $19\frac{1}{2} \times 5\frac{1}{4} \times \frac{3}{16}$. Three bottoms, one piece each $19\frac{1}{2} \times 5\frac{1}{4} \times \frac{3}{16}$. Four cleats $11\frac{1}{2} \times 1\frac{1}{16} \times \frac{3}{16}$.

Exception No. 2—Same dimensions as Exception No. 1 with $\frac{3}{16}$ -inch sides, which can be 50% two pieces when dressed and matched.

Other containers were approved as displayed. The box manufacturers will endeavor to meet all requirements along the lines of the adopted standards and can do so if you will place your orders immediately, so that they can take advantage of the slack season in other departments to divert regular employees to making these boxes.

The purpose in calling the conference of November 24th was to avoid the uncertainties of last season as to deliveries and to prepare for the condition of labor shortage, which will undoubtedly be most serious in 1918. Will you not co-operate by placing orders for boxes and accepting deliveries as early as possible?

UNION PACIFIC SYSTEM.

Oregon-Washington Railroad & Navigation Company.

General Passenger Department.

PORTLAND, OREGON, January 29, 1918.

EDITOR BETTER FRUIT:

"War Gardens" is a little pamphlet issued by this company for the purpose of stimulating food production this coming season. I am pleased to enclose a copy.

This is in continuation of our efforts along the same line in past years. Under the auspices of the extension departments of the Oregon Agricultural College and State College of Washington last season our campaign throughout Oregon and Washington resulted in the formation of "garden clubs" in nearly all of the places visited, and, according to reports, in a largely increased acreage in gardens and field crops. We aim to continue the work this year in the hope of still greater increase, and this pamphlet is the "first gun."

It is free for distribution. Such mention as you may see fit to make of it to that end may, we trust, be regarded by you as co-operation in behalf of a good cause, and will be much appreciated by all concerned.

WM. McMURRAY,
General Passenger Agent.

Subscribe to the Y. M. C. A. and keep on subscribing. They are adding cheer and comfort to the lives of our soldier boys in Europe.

The United States will have 1,000,000 men in France, maybe more. Keep the lines open and the food moving.



Orchard Brand Standard Arsenate of Lead (paste) is guaranteed not to contain less than 15% Arsenic Oxide, not to exceed 50% water, and not to exceed 0.5% soluble arsenic. It is a soft, creamy paste, so manufactured, by chemical and mechanical processes, as to give the best possible results under orchard conditions.

Orchard Brand Powdered Arsenate of Lead is double the strength of the paste, and when used in water only one-half the quantity of the preparation is required. It is a finely divided powder that mixes readily with water and remains in good suspension when diluted in the spray tank. To control Codling Moth and similar insects, use 2 pounds to 100 gallons of water.

A full line of other materials for control of aphids, etc., ready for shipment

Responsibility of the maker of insecticides is so important that you should be most careful of the brand you buy. Reliable sprays will save the crop, while unworthy ones may ruin it.

To get your sprays when needed buy of the dealer handling **Universal and Orchard Brands.**

Write for full information and directions.

General Chemical Co.

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Till Your Orchard
as thoroughly as you cultivate your cornfield. Intensive tillage conserves the moisture and sets plant food free. For more and better fruit, use an

**"Acme"
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Works right under the branches. The sharp-ground coulters work the soil easily, cutting out weeds and leaving a loose dust mulch at the top. Extension and regular styles—1 horse to 4 horse sizes—3 ft. to 17½ ft. wide. Our free book, "The Acme Way to Crops That Pay," points the way to bigger orchard profits. Send today.

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343 A E. Morrison St.
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STEAM PRESSURE
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A Patriotic Duty
Serve by Saving. Can fruits, vegetables and meats. Let nothing go to waste. Every mouthful is needed.

The wonderful, simple "NATIONAL" Steam Pressure Canner makes this work quick and easy. Prevents spoilage. Cans anything in glass or tin. Make big profits. Home outfit \$18. Commercial outfits up to \$2,000. Write for FREE catalog.

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"Use Your Brains to
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STOP! THINK!

"CARO FIBRE"

Fruit Wrappers

LOOKS BEST

PACKS BEST

PICKS UP BEST

"CARO" DON'T TEAR

STRONG DRY

STRONG WET

THE BUYER KNOWS "Caro" Prolongs the Life of Fruit

Don't Be Fooled by PRICE. Don't Be Penny Wise

Give Your Fruit a Chance
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Fine Oregon Orchard for Sale

Trees 9 Years Old

13 acres, tile drained and irrigated, water costs \$2.50 per acre, of which about 3 acres are in pears, one acre peach fillers, balance some Newtowns and Jonathans, but mostly Spitzenbergs. Trees in fine condition, showing an abundance of fruit spurs. A few loganberries, blackberries and raspberries.

4-room house with porch; fine barn and sheds; 4 chicken houses, about 20 booder houses; good well; electric lights and telephone system; on paved street about one mile from station.

The tract is sprayed, pruned and plowed. Title clear.

Price \$500 per acre on easy terms. No trades. Can give immediate possession.

The city has good schools, a fruit drying plant for culls, also a Fruit Growers' Association, with large warehouse and a Spray Manufacturing plant.

MARK N. TISDALE, Sutherlin, Oregon

For Sale

One Deming Power Sprayer, "Victory," three h. p. Novo Engine, Duplex pump, 200-gallon tank, two 50-foot leads of hose, pressure gauge and tank filler. Used very little; in good condition. Cost \$380.00. First check for \$175.00 gets complete outfit, f. o. b. this station.

A. F. PAGE
Stevensville, Montana

A Good Mixer

Rice has little individual taste and takes on the flavor of the dish with which it is combined. Whether freshly cooked or left over, it can be mixed with the other ingredients in bread making in proportions varying from a 50-50 ratio in cornbread and a two-to-one ratio in wheat bread down to the few left-over grains that should be dropped in somewhere. Don't be afraid to use cooked rice in any kind of bread you are making. One part rice flour to three parts wheat flour makes a loaf of fine texture similar in appearance to the all-wheat loaf. Housekeepers, however, need not wait for rice flour to be manufactured. All they have to do is to combine one-third of steamed rice, well mashed, with two-thirds of wheat flour, made up according to the usual formula for white bread.

Cornmeal and Rice Waffles.—Mix together a half cup of cornmeal, a half cup of flour, a cup of boiled rice, a teaspoon of salt, a teaspoon of baking powder, tablespoon melted fat, two beaten eggs and a pint of milk. Beat well and bake in well greased hot waffle irons.

Rice Gems.—One egg, one cup milk, one cup cold boiled rice, one cup flour or three-fourths cup of cornmeal, one teaspoon salt, one teaspoon baking powder, one tablespoon of melted fat. Bake in greased hot gem pans.

Rice Batter Cakes.—Add to one cup of cooked rice a beaten egg, one-half cup of milk, one teaspoon fat, enough flour to make it hold together and one-half teaspoon baking powder. Cook on griddle and serve with syrup.

A Cheerful Thought

Be cheerful. Mental depression checks digestion. Poor digestion wastes food. Wasted food helps the enemy. Cheerfulness is conservation.

Don't kick over the meatless and wheatless days. They are helping supply our Allies with food, which means winning the war.

It is better to go without a little and save now than pay indemnity to Germany.

Abuse of Water on Fruit, Etc.

Continued from page 5.

blight. In reality it was in all cases easily traced to drouth.

We first produced this disease experimentally in 1913 at Wenatchee by subjecting Winesaps to a sudden and severe drouth following a period of normal growth. The following year the disease was occasionally met with, but, as many will recall, the year 1915 was especially unfortunate for growers in the Wenatchee country who were served by a certain irrigation canal. It had been allowed to get into such a state of disrepair that frequent interruptions of water supply were encountered which varied from a day or two to more than two weeks in extent. Naturally orchards on shallow soil or very open soil suffered severe drouth and



PAJARO VALLEY IS ONE OF THE CLEANEST HORTICULTURAL DISTRICTS IN THE UNITED STATES

This condition is due largely to the State and County investigations that have been conducted there by Mr. W. H. Volck.

Mr. Volck is now Director of Research of the California Spray Chemical Co., and his recommendations are of the highest authority.

Success in orcharding depends upon the orchard management, and one of the serious factors of orchard management is spraying. Expert opinion can be readily obtained by writing Mr. Volck.

ORTHO DRY Arsenate of Lead, in competition with other brands, received the highest award ever conferred on sprays at any exposition.

ORTHO DRY Arsenate of Lead is a light, finely divided powder, equally suitable for either wet or dry application. The convenience and ease of handling should recommend it to any progressive fruit grower; only half the weight to haul; no rubbing or or mixing; just put it in the tank and start the agitator.

ORTHO DRY Arsenate of Lead has been used in all the fruit growing districts of the Pacific Coast, and has an army of friends who maintain that it is vastly superior to any other lead arsenate.

Successful control of pests depends largely upon the sprays used. You get the best results when you use **ORTHO DRY Arsenate of Lead**.

California Spray Chemical Co.

Seattle—Watsonville—New York

many fine crops of Winesaps and Staymans were ruined. The series of drouths which were encountered that year produced no less than four different sets of drouth spots on the same apples. In many orchards trees were killed before the end of the season and many more died during the following summer. The fine feeding roots had been destroyed by the drouth and the trees were unable to recover.

Apples affected with drouth spot seldom fall from the tree and with the resumption of irrigation will continue to grow. The drouth spot itself is simply a collection of cells from which the water has been extracted to such a degree that they are killed. When irrigation is resumed the other cells start to grow again and the apple expands around the dead portion, producing a misshapen fruit covered with depressed spots. The dead tissue is quite shallow, but may be of considerable lateral extent. Apples affected with such acute drouth as described do not usually attain the size of normal fruit and do not properly mature. In storage they appear to keep as well as other apples, but the flavor is flat and something like that of a green apple.

As a result of drouth during the latter part of July and early August there results a condition of apples which we term "punk" for lack of a better name. But this term is quite descriptive. The apples appear mottled in color and when pressed are found to be somewhat rubbery and elastic. The interior is streaked and spotted with brown punky flesh which is rather dry and mealy. This condition has been met with only in isolated sections of orchards in the Northwest, but in the East whole orchards are reported to be involved. York Imperial seems especially susceptible, but it is also found on Ben Davis, Gano and Spitzenberg as well as other varieties.

There are numerous other drouth troubles, so called because drouth enters largely into their cause, but it must be understood that these diseases comprise disorders due in part to other causes, since, as was pointed out earlier, drouth may interfere with the proper nutrition of the plant. A drouth trouble does not necessarily mean that a physical lack of moisture alone is concerned. Different effects follow drouth at different times of the year and on different varieties.

Another drouth trouble which might be mentioned is cork, which is a disease often mistaken for bitter pit, or Baldwin spot, and which has been very prevalent in some sections of the Northwest. In this disease the flesh of the apple is filled with brownish corky spots usually spherical in shape and often confined to the region of the core. They are often found in connection with the main vascular about the core. Sometimes there is no external evidence of the disease, but the surface of the apple over a spot may be depressed and at times there is a sticky yellowish exudate on this area similar to that found in the case of drouth spot. When cut the apple appears to have a cheese-

Orchard Disking Pays!

AND THIS ORCHARD FOLDER TELLS WHY

Bigger and better crops this Season will result from proper and deep cultivation with

Cutaway ORCHARD
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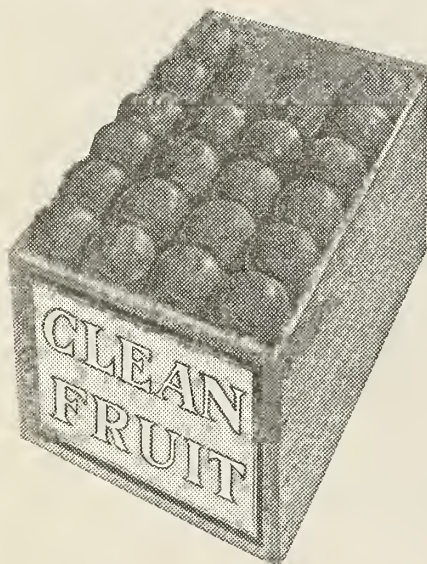
like consistency. The disease is very prevalent on certain open types of soil. Sandy or gravelly soils which are deficient in humus and which have very free underdrainage are usually found in connection with this disease. Our investigations lead to the conclusion that this trouble is a drouth reaction resulting from a water shortage early in the season. Where irrigation is adequately given from the time of blossom-

ing on the disease is eliminated or greatly reduced. Cork was formerly quite prevalent in certain sections which have only recently established irrigation systems. Reports from such sections indicate that since irrigation has been practiced the losses from the disease are much less.

The remedy for this class of diseases is, of course, prevention of drouth. After the disastrous season referred to

in the Wenatchee country the growers assumed control of the canal themselves and have since operated it most successfully. But with the most reliable irrigation service it may sometimes happen that a portion of the orchard will become very dry. There may be spots which are difficult to cover, or the soil may be very open. In either case the remedy is largely in the hands of the grower. He can rearrange his flumes to cover the high spots and he can put more humus into his soil to help hold the moisture. If there is a water shortage, the supply should be spread out as far as possible. Beginning with one furrow to a row as many rows as possible should be covered. After the entire orchard is gone over with this furrow the process should be repeated with another, and so on until the entire space is covered. At such times it is better to irrigate with one furrow and do it thoroughly than to wet the surface only of several furrows.

Passing now to the other extreme we find several diseases caused by an overabundance of water. Possibly the one which first occurs to us is the one caused by alkali. It so happens that the soil in our arid and semi-arid fruit districts is filled with a number of soluble salts popularly spoken of as "alkali," and that some of these salts when present in excessive amount are harmful to vegetation. It would seem that knowledge of this fact, which is so generally recognized, would lead to more precautions than are ordinarily met with to guard against the injury. Only this last summer I visited a prominent and widely advertised irrigation project where hundreds of young trees had been killed by alkali. They had been planted in a pocket on low ground and no drainage was supplied. Seepage from higher ground had carried down among the trees quantities of injurious salts and there was only one result possible in the absence of a drainage outlet. It was an expensive object lesson, for not only was there the loss of the trees in question and of several years' effort in growing them, but a rather unsavory reputation for the project was established. Growers should always see that there is no possibility for the accumulation of seepage or drainage water on their orchards. In the irrigation scheme of orcharding there is as



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much importance to getting undesirable water off the land as in getting necessary water onto it.

You have heard considerable about bitter pit, or, as it is more generally known in the Northwest, Baldwin spot. Every grower has undoubtedly experienced some loss as a result of this disease. It is prevalent wherever apples are grown, but certain varieties are especially susceptible. In the past the Baldwin was badly affected, from which fact the name Baldwin spot was given to the disease. Here in the Northwest several of the best varieties are commonly affected, Grimes, Jonathan, Delicious, Winter Banana and Yellow Newtown among others. It most often appears after the fruit is picked and packed. When the grower thinks he has packed an especially fine lot of large apples he is liable to discover that bitter pit has appeared and it is necessary to repack and sort out some of the finest specimens. If the grower does not discover the disease before the fruit is shipped there is a disaffected buyer.

The Department of Agriculture began an investigation of this disease in the Wenatchee Valley in 1913, the work being in charge of Dr. Charles Brooks and the writer. We were convinced by earlier investigations that bitter pit is not due to fungi or bacteria. The theory of arsenical injury was untenable in light of the fact that the disease occurs on both sprayed and unsprayed apples. The question of the influence of soil moisture seemed to be an extremely important one and it has been very carefully investigated. At the beginning of the experiment it was necessary to differentiate between several spot diseases which superficially resemble bitter pit, as pointed out in a paper read before this association in 1915. A complete report of this experi-

mental work is soon to be issued so that it will not be necessary to anticipate this publication except in a general way.

Working on Grimes Golden in 1915 we obtained results as follows two weeks after picking and storing in an ordinary cellar: (1) From heavy irrigation all season, 43 per cent. (2) From medium irrigation all season, 17 per cent. (3) From light irrigation all season, 14 per cent. (4) From medium irrigation until August 24, then heavy, 49 per cent. The fruit was continued in

cellar storage and by November 9 the per cent of diseased apples had increased from 9 to 27 per cent above the amount shown on September 29, but the relative amount of bitter pit from the different treatments was not changed. After November 9 there was very little increase of the disease.

In 1916 we endeavored to obtain further data on the effects of soil moisture late in the season, and on abrupt changes in the amount of soil moisture. Results secured on October 18, or about one month after picking and storing



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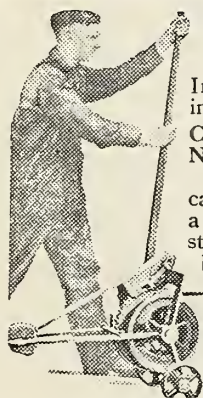
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the diseased apples in the cellar, were shown to be as follows: (1) From heavy irrigation all season, 20 per cent. (2) From medium irrigation all season, 10 per cent. (3) From light irrigation all season, 12 per cent. (4) From medium irrigation until August 1, then heavy, 29 per cent. (5) From medium irrigation in June, followed by heavy irrigation in July and light in August and September, 5 per cent. (6) From heavy irrigation in June, followed by light irrigation in July, but heavy thereafter, 35 per cent. The apples were held in storage until the following March without affecting the relative contrasts above reported, and which are seen to be in general agreement with the results obtained the year before, and which further emphasized the importance of heavy late irrigation in the production of the disease.

Data were also obtained in both years on the amount of bitter pit appearing in the various sizes of apples secured from the different plots, but the details of this work need not be given here. In general we may say that we found large apples more susceptible to bitter pit than the small ones, but size could not be taken as a measure of susceptibility since we found the small apples on the heavily-irrigated plots often developed more disease than the large apples on the lightly-irrigated ones.

The results of the various experiments have been uniformly consistent in showing that heavy irrigation favors the development of bitter pit. Heavy irrigation throughout the season has given less of the disease than medium irrigation followed by heavy, and light irrigation throughout the season has resulted in more bitter pit than heavy irrigation followed by light. The amount of irrigation in August and September has apparently largely determined the amount of disease. Sudden changes in the amount of soil water do not appear to have had any effect on the amount of disease. Large apples have been more susceptible to bitter pit than small ones, but the increase in the disease from heavy irrigation has been almost as great on the small and medium-sized fruit as on the large. Apparently apples are susceptible to bitter pit not merely because they are large, but rather because of conditions that may sometimes accompany an increased growth. The results as a whole point to the harmful effects of heavy



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late irrigation regardless of the size of the fruit.

Large apples command the highest prices and growers are naturally anxious to produce a maximum of the large sizes and hence the practice of pouring on the water late in the season to "swell" the fruit. This is a positive abuse of water. If the variety is susceptible to bitter pit the apples are rendered more susceptible. All varieties when grown to excessive size are notoriously poor keepers. As a rule the larger the apple the shorter is its storage life.

The result of another abuse of water on trees is found in winter injury. There are two types of winter injury, both more or less dependent on soil moisture. The first type is found in cases where irrigation is continued late in the fall, continuing a state of vigorous wood growth until freezing weather is encountered. In this case the new wood is not allowed to mature and harden enough to withstand the low temperatures and the tender growth is killed. Another type of winter injury is found in cases where the trees are allowed to dry out too early in the fall,—when irrigation is discontinued too soon. Last year this type of injury was quite common in certain parts of the Okanogan country. It appeared most frequently on trees growing on open gravelly knolls and where irrigation was suspended as early as September 1. Nearby trees on heavier soil and those which had received later irrigation showed no signs of injury.

Possibly much of the foregoing discussion is an old story to most of you, but it cannot be emphasized too often that in the use of irrigation less rule of thumb and more intelligent application of established principles will bring best results. If irrigation were more often considered for its effect on the health of the trees and not merely as a necessary substitute for natural rainfall we would have fewer mysterious tree ailments. I venture to say that not one grower in a hundred uses a soil auger to determine the adequacy of his irrigation, and that not many more have any other reliable means of knowing what the soil-moisture conditions in their orchards may be. It is a very important matter and one that should not be left to guess work.

In preparing this article I was asked to take up the subject of "collar rot,"

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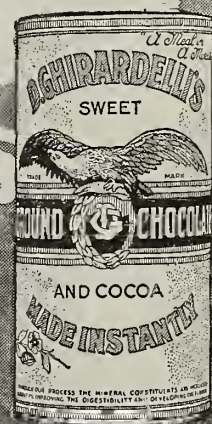
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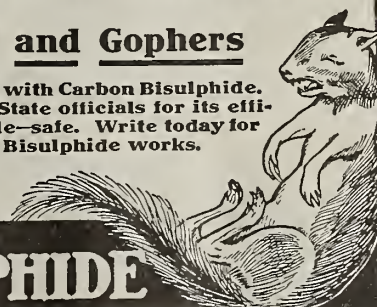
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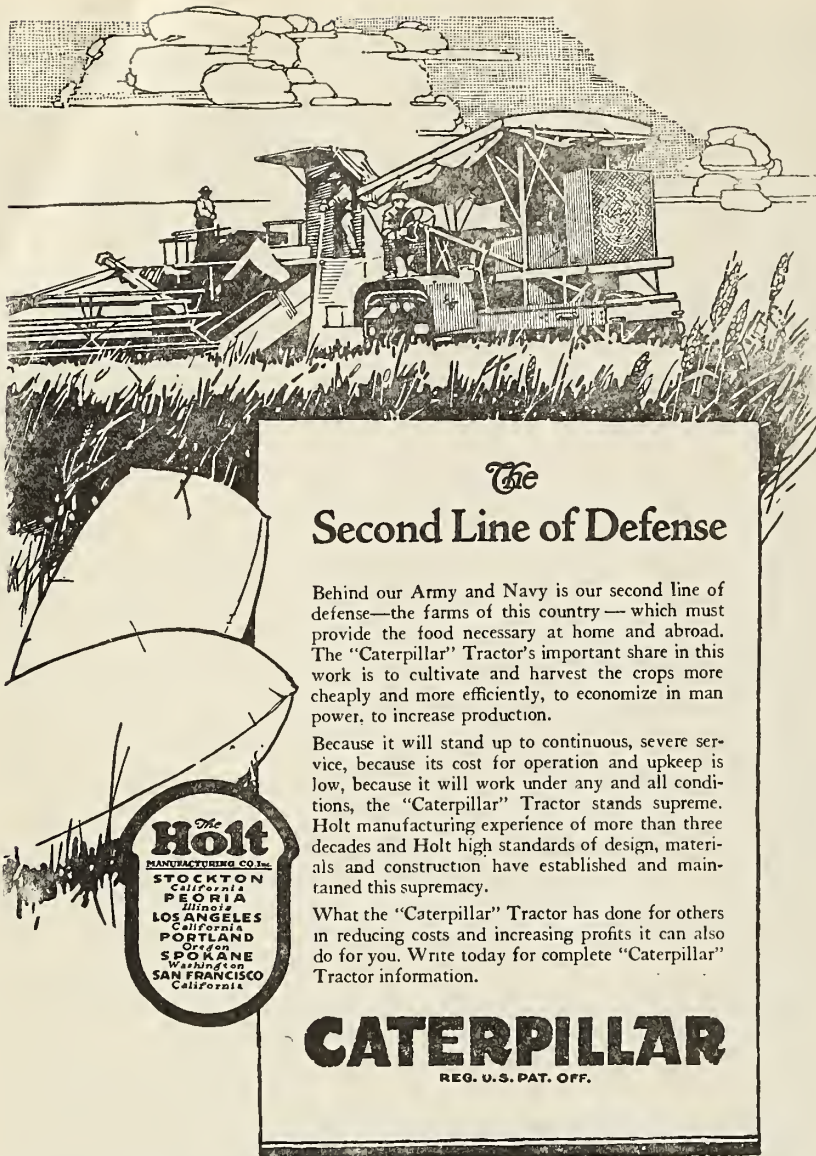
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which is generally regarded as associated with an abuse of irrigation water. I am not sure that I can agree that it is due to an abuse of water, primarily, but it is of so much importance to the orchard industry, not only of the Northwest, but of the whole country as well, that we can well devote some discussion to it. We have heard many theories as to the cause of the disease. We have heard that it is due to alkali troubles; that it is due to irrigating too close to the trees; that it is due to winter injury; and that it is due to a dozen other causes, but really there has been very little knowledge about the disease in the Northwest. No doubt I shall startle many of you when I say that a large proportion of the cases of "collar rot" are in fact "collar blight" and due to fire blight directly. The other factors cited above as causes may contribute to the prevalence of the disease and in some cases may afford the blight bacteria an easy entrance for the further progress of their work, but it is certain that much of the trouble can be traced to fire blight. Why the blight should appear in this localized part of the tree and not in the tops is not known. Varieties known to be susceptible to blight, such as Spitzenberg, Grimes and Jonathan, are also most subject to collar rot. Aside from the regular form of fire blight, if one may be permitted to assign it a "regular" form, the collar rot disease is undoubtedly the most serious menace to the orchard industry of the Northwest. It should be dealt with most vigorously, and systematic attempt made to hold it in check. Where it is found in time it may be controlled by cutting out the infected portions and disinfecting the wounds in the manner you are familiar with in the case of blight in the tops of the trees. Covering the wounds with melted grafting wax after disinfecting them will facilitate healing, but in small cuts this is not necessary. In case a tree is girdled more than half way around it is a large question whether it is worth while to bother with it, as the chances are that it will not recover. The practice of planting small trees

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around the trunk of a girdled large tree, and bridge grafting is not worth the trouble. Bridge grafting will save many trees if they have enough roots left to graft to, but a better practice is to systematically examine all of the trees in the orchard to detect the disease before it has progressed so far as to require such treatment. I recall one orchard with a number of collar-rotted trees which the grower was endeavoring to save by bridge grafting. Most of them had progressed too far to expect any results. It occurred to me that where so many advanced stages of the disease were found there must be a number of incipient cases. On the five acres we found six trees showing visible signs of collar rot in the sparse, yellowed and sickly foliage, the small apples produced in such abundance, and the slight new wood growth. I suggested to the grower that he uncover the crown of every tree, carefully removing the soil so as not to injure the trunk or roots, and that in case any early stages of the disease were found that the infected parts be cut out and treated the same as for blight. This was done and fifteen such cases were found and successfully treated. In none of these cases could the presence of the disease be detected in the tops as no symptoms of collar rot were shown. It would appear that this should become a regular orchard practice if collar rot is known to exist in the orchard or on neighboring tracts. The disease has become so widespread that it is now difficult to find a single orchard where some evidence of the collar rot cannot be found. Careful examination to detect the early stages of the disease involves considerable labor, but if the value of the trees is considered it is a small effort comparable with the results secured.

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of "Better Fruit," Published Monthly at Hood River, Oregon for April, 1918

State of Oregon, } ss.
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Before me, a notary public in and for the state and county aforesaid, personally appeared E. H. Shepard, who having been duly sworn according to law, deposes and says that he is the editor and business manager of "Better Fruit," and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, (and if a daily paper the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:
Publisher, Better Fruit Publishing Company, Hood River, Oregon.
Editor, E. H. Shepard, Hood River, Oregon.
Managing editor, E. H. Shepard, Hood River, Oregon.
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(Signed) E. H. SHEPARD,
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leaf. Rub rabbit with salt and pepper and lay it upon this dressing, putting fat of oleo here and there over the rabbit. Sift a little flour over the top and pour a cup of stock or hot water into the pan. Cover tight and roast, basting frequently. When ready to serve, put on a hot platter and garnish with slices of lemon and cranberry jelly or currant jelly.

Spiced Rabbit.—Wash rabbit in soda water. Disjoint hind legs; cut off the saddle; remove the forequarters, making in all nine pieces. Lay in salt water about an hour. Place rabbit in dish with vinegar poured over it and let it remain over night. Remove from pickle, salt each piece lightly and arrange in baking pan. Cut up an onion in it, adding one bay leaf, a dozen pepper corns, part of a celery root, a cup of stock and a little vinegar from the pickle. Cover with another pan, put in a quick oven and bake an hour. Remove upper pan, and brown, basting frequently. When brown, remove and arrange pieces on a hot dish. To the pan add a tablespoon of flour browned in fat drippings and a cup of stock. If not spiced enough, add pepper and a very little mace. If desired, add a can of mushrooms that have been drained and washed. Pour the gravy over the rabbit, dust with chopped parsley, and send to the table.

Boiled Rice

One-half the battle in teaching people to eat rice lies in giving instructions for its proper preparation. In the Southern States and Chinese restaurants it comes to the table with each snow-white grain distinct and separate from the rest. Rice can be successfully cooked either by boiling in a large quantity of water and draining, or by boiling with just enough to swell the grains perfectly. Let "Black Man" describe the first process:

Boiled Rice No. 1.—"Black Man's" recipe to prepare rice is, "Wash him well, much wash in cold water, the rice flour make him stick. Water boil already very fast. Throw him in, rice can't burn, water shake him too much. Boil quarter of an hour or little more; rub one rice in thumb and finger, if all rub away him quite done. Put rice in colander, hot water run away; pour cup of cold water on him, put back rice in sauce pan; keep him covered near the fire, then rice all ready. Eat him up!"

Boiled Rice No. 2.—Always wash the rice until all cloudiness has disappeared from the water. Sprinkle gradually a cup of rice in a pint of vigorously boiling water, salt to taste, boil for fifteen minutes, then place on the back of the stove where it will finish swelling without burning. If a gas stove is used, turn the gas low and put an asbestos mat under the kettle. Cook in a covered vessel.

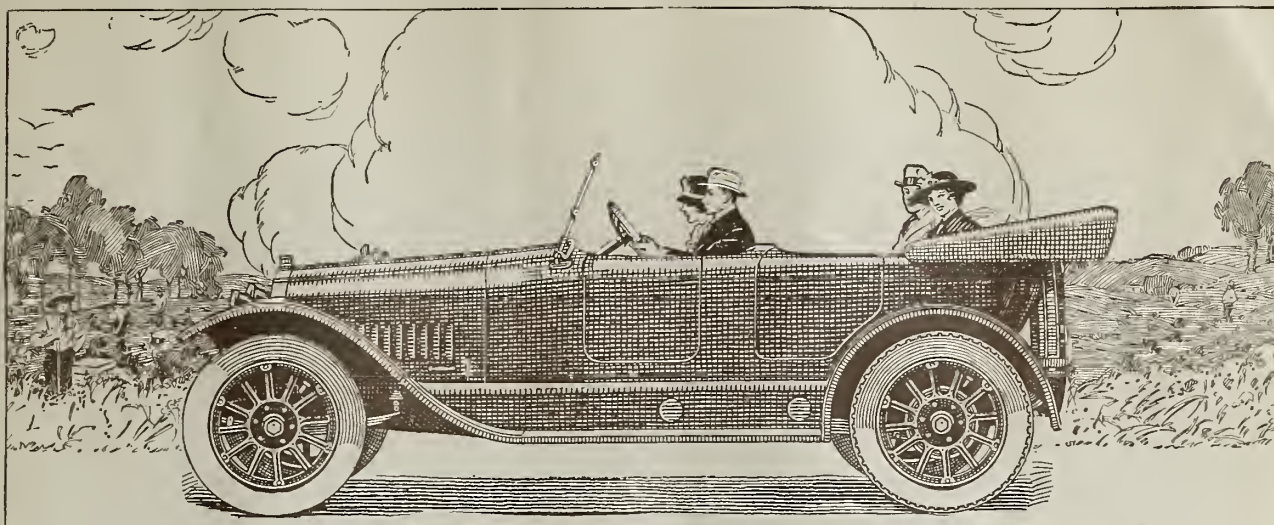
Steamed Rice.—To one pint of washed rice add one pint of water and one-half teaspoon of salt. Place in a covered steamer and cook with live steam for one hour. Stir and take up with a fork to prevent gummy and lumpy appearance. Never stir rice with a spoon.

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